

**SECTION 208****TRENCH EXCAVATION AND BACKFILL****01DESCRIPTION****208.01.01 GENERAL**

- A. This work shall consist of the excavation and backfill of trenches for the accommodation of substructures including, but not limited to electrical conduits, telephone conduits, television cable, traffic signal conduits, gas lines, sewer lines, water lines, and storm drains except where governed by utility agency specifications. These other agencies are responsible for the trench to the top of subgrade (bottom of the pavement section).
- B. When the terms "Backfill" or "Trench Backfill" are used herein, they shall be construed to mean one or more of the types of backfill specified below under "Materials."
- C. The designing engineer shall comply with the intent of the pipe material as defined as either rigid or flexible in conformance with the AASHTO LRFD Bridge Design and Construction Specifications and this Section. Special attention shall be given to the sidewall material properties as this section assumes a minimum AASHTO A1 or A3 material. Other sidewall material type shall be given special consideration for minimum trench widths, the use of Controlled Low Strength Materials (CLSM), or other critical processes that would affect the pipe ability to withstand the load and shall also be noted on the plans and specifications for the project.
- D. The type of pipe and applicable installation requirement (trench and embankment) to be used as demonstrated by the design and approved by the Agency Engineer shall be clearly noted on the drawings and specifications along with installation procedures that may differ from this section.
- E. Quality control field inspection and testing requirements including frequency shall be in accordance with Contracting Agency requirements.

**208.01.02 DEFINITIONS**

- A. **Foundation:** Over-excavation and backfill of the foundation is required only when the native trench bottom does not provide a firm-working platform for placement of the pipe bedding material.
- B. **Bedding:** In addition to bringing the trench bottom to required grade, the bedding levels out any irregularities and ensures uniform support along the length of the pipe.
- C. **Haunch Zone:** The backfill under the lower half of the pipe (haunches) distributes the superimposed loadings.
- D. **Initial Zone:** The backfill from the springline to the top of the pipe zone provides the primary support against lateral pipe deformation for flexible pipe.
- E. **Final Zone:** Backfill above the pipe zone to the top of subgrade.

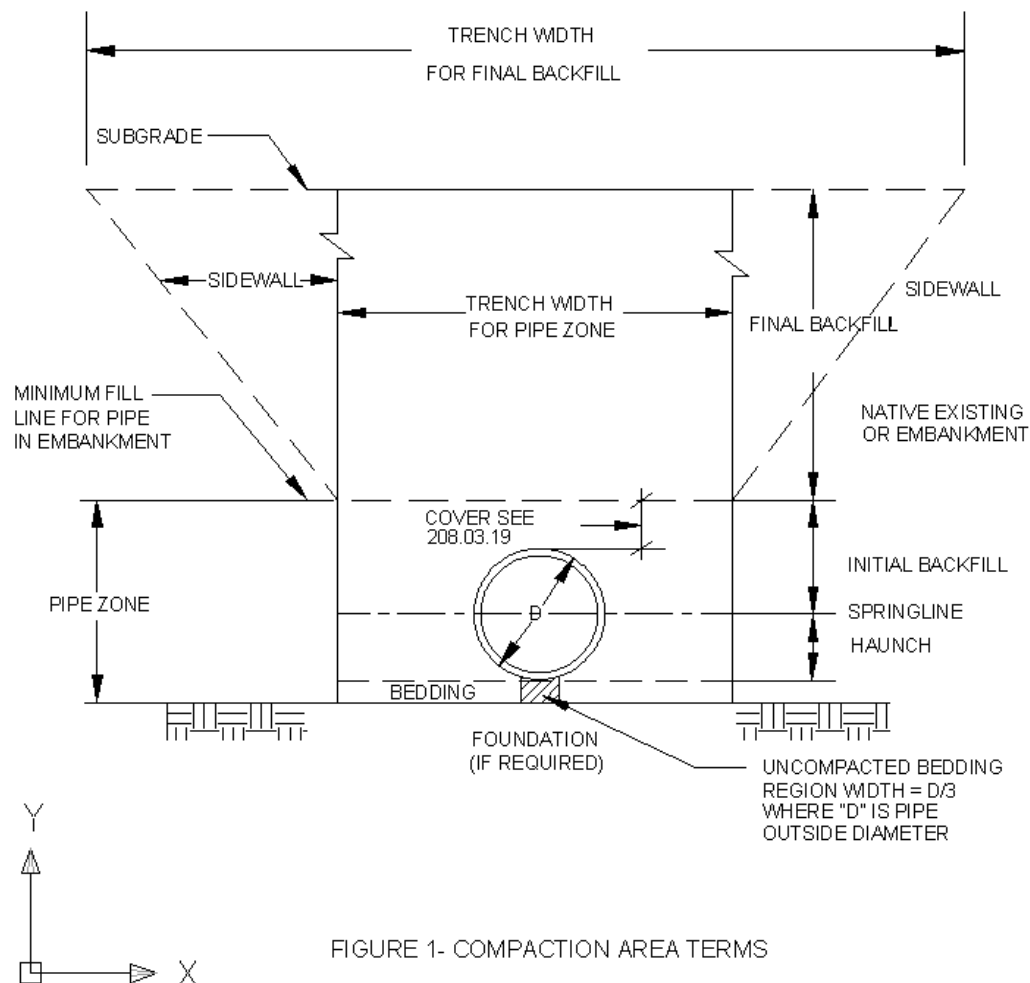


FIGURE 1- COMPACTION AREA TERMS

## 02MATERIALS

## 208.02.01 GENERAL

- A. The material placement in the pipe zone area shall first comply with Table 1, when applicable.

Table 1 - Pipe Zone Maximum Particle Size for Backfill

Nominal Pipe Size (inches)	Maximum Particle Size (inches)
2 to 4	1/2
6 to 8	3/4
10 to 16	1
18 and larger	1-1/2

- B. One of two methods of compaction of the trench pipe zone shall be used and shall be specified in the Construction Documents and approved by the Engineer prior to construction:
1. **Method A:** The use of CLSM as defined in this section.

2. **Method B:** The use of aggregate materials as described in this section as associated with either Rigid or Flexible designed pipe shall be as specified in this subsection below.
- C. Prior to construction, the materials and method type shall be submitted and approved by the Engineer.

#### 208.02.02 SELECTED BACKFILL

- A. This material shall be similar to that removed from the trench excavation or may be imported material as specified in **Subsection [207.02.01](#), "Selected Backfill,"** or as otherwise shown on the Drawings.

#### 208.02.03 GRANULAR BACKFILL

- A. Granular backfill shall be as specified in **Subsection [207.02.02](#), "Granular Backfill."**

#### 208.02.04 SAND BACKFILL (DRY UTILITIES ONLY)

- A. Sand backfill shall consist of natural sand or a mixture of sand with gravel or stone. In addition thereto, the material shall conform to the following gradation requirements:

**Table 2 - Sand Backfill Gradation**

Sieve Sizes	Percentage of Weight Passing
3/8 inch	100
No. 4	80-100
No. 200	5-20

- B. The plasticity index of the material shall be as specified in **Subsection [704.03.01](#), "Plastic Limits."** The soluble sulfate content shall not exceed 0.3 percent by dry weight of soil.

#### 208.02.05 TYPE II AGGREGATE BASE BACKFILL

- A. Type II aggregate base backfill shall be as specified in **Subsection [704.03.04](#), "Type II Aggregate Base."** The total available water soluble sulfate content shall not exceed 0.3 percent by dry weight of soil.

#### 208.02.06 DRAIN BACKFILL

- A. Drain backfill shall be as specified in **Subsection [704.03.02](#), "Drain Backfill."** The type shall be as shown on the plans or approved by the Engineer.

#### 208.02.07 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

- A. Backfill shall be as specified in **Subsection [704.03.07](#), "Controlled Low Strength Material."**

#### 208.02.08 CRUSHED ROCK

- A. The materials properties shall conform to **Subsection [704.03.06](#), "Crushed Rock."**

**208.02.09 TYPE III AGGREGATE**

- A. Aggregate properties and gradation shall conform to Type III as specified in **Subsection 704.03.05, "Type III Aggregate,"** or as approved by the Engineer.

**03CONSTRUCTION****208.03.01 TRENCH EXCAVATION, GENERAL**

- A. Excavation including the manner of supporting excavation and provisions for access to trenches, shall comply with the current regulations as determined by NOSHA. Excavation shall include, without classifications, the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of said materials shall conform to the lines and grade shown. Excavation for pipe, wire, or conduits shall be by open trench unless otherwise specified or shown on the plans. However, should the Contractor elect to tunnel or jack any portion not so specified, he shall first submit a design by a Nevada Professional Engineer to and obtain an approval from the Engineer. The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavation, and all pumping, ditching, or other approved measures for the removal or exclusion of water, including storm water and wastewater reaching the site of the work from any source so as to prevent damage to the work or adjoining property. The Contractor shall be responsible for any damage to persons or property due to interruption or diversion of storm or wastewater because of his operations. If due to delays in delivery of materials or for other reasons, and the Contractor is not expected to fully complete the work within any excavated area in a reasonable length of time as determined by the Engineer, the Engineer may require the Contractor to backfill the excavation and re-excavate when the work can be completed expeditiously, with no additional payment therefor.
- B. Except as otherwise shown or provided herein, excavation shall be open cut trenches with vertical sides up to the top of the pipe zone.

**208.03.02 MINIMUM TRENCH WIDTH**

- A. Excavation of pipe trench for flexible and rigid pipe is as required in Table 3 and this width is only applicable for trenches that have trench sidewall of native material" which meets the classification class A1 or A3 installation as defined in AASHTO M145 table. In all cases, the trench width shall be wide enough to allow for the compaction equipment.

**Table 3 - Minimum Trench Widths**

Flexible Pipe	Minimum shall be not less than 1.5 times the pipe outside diameter plus 12 inches
Rigid Pipe	Minimum shall be not less than the outside diameter plus the outside diameter times 0.33

- B. For pipe backfill using CLSM, the minimum trench width may be reduced to the pipe diameter plus 12 inches and enough room needed to allow for the proper placement of the CLSM using tools to "spade" the material under the pipe haunches. This condition applies only for trench sidewalls meeting the minimum AASHTO material class A1 or A3.
- C. If the sidewall trench soil is classified other than AASHTO Class A1 or A3, a recommendation by a Nevada Professional Engineer shall be submitted and approved by the Engineer prior to construction. However, minimum trench width shall not be less than the minimum stated in this section.

**208.03.03 MAXIMUM TRENCH WIDTH**

- A. The maximum width of the trench shall be determined by the Contractor based on the method and means for the installation. However, trench width shall not exceed the width of a ride-along compactor plus 2 feet when working along side the pipe or culvert. If for any reason this maximum trench width is exceeded, a higher strength of pipe may be required as determined by the Engineer with no additional cost to the Contracting Agency.
- B. Except when otherwise specified or ordered by the Engineer, the bottom of the trench shall be excavated uniformly to the grade or depth indicated on the drawings. The maximum amount of open trench permitted in any one location shall be 500 feet, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater, unless otherwise approved by the Engineer. Trench shall be considered open until backfilled to the top of subgrade. Trenches crossing streets shall be completely backfilled immediately after pipe, wire, or conduit installation.
- C. Substantial bridging, properly anchored, capable of carrying the design loading, in addition to adequate trench bracing, shall be used to bridge across trenches at street crossings where trench backfill and temporary patches have not been completed during regular working hours. Safe and convenient passage for pedestrians and access to all properties shall be provided.

**208.03.04 TRENCH OVER-EXCAVATION**

- A. Wherever the excavation is made below the grade shown on the drawings, or below the grade ordered by the Engineer, it shall be refilled to the required grade with suitable backfill and bedding material ""at no additional cost to the Contracting Agency.
- B. Trench over-excavation below the specified level of bedding material, and additional backfill material, ordered by the Engineer where unsuitable materials are encountered, shall be paid by the appropriate contract item.
- C. Trench over-excavation and backfill to control groundwater shall be at the option and expense of the Contractor; however, the backfill material shall comply with this specification and the approved design of the pipe.

**208.03.05 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATED MATERIALS**

- A. Excess material and excavated material unsuitable for backfill shall be removed from the site of the work by the end of each working day unless otherwise approved by the Engineer and disposed of by the Contractor as specified in ***Subsection [107.14](#), "Disposal of Material Outside Project Right-of-Way."***

**208.03.06 CHANGES IN ALIGNMENT OR GRADE**

- A. In the event that changes in elevation of the trench of less than 6 inches are ordered by the Engineer, no changes in the contract amount will be allowed. When such changes in elevation are more than 6 inches or changes in alignment are made that change the character of the work required, the work shall be performed as specified in ***Subsection [104.02](#), "Increased or Decreased Quantities and Change in Character of Work."***

**208.03.07 PORTABLE TRENCH SHIELD**

- A. Portable trench shields or boxes that provide a moveable safe working area for installing pipe may be used for the installation of pipe. After placing the pipe in the trench, backfill

material shall be placed in lifts and the shield shall be lifted to allow for the backfill material to be placed for each lift, trench wall to trench wall.

#### 208.03.08 MINIMUM PIPE SPACING

- A. If the pipe space between parallel pipes in a single trench is not conducive to mechanical backfill, then CLSM shall be used.

#### 208.03.09 TRENCH BACKFILL

- A. The backfilling of the trench differs in each zone due to the complexity of providing a secure support for the pipe as well as ensuring that all voids are filled to prevent nuisance water flow under the pipe. The zones are foundation, bedding, haunch, initial, and final as illustrated in Figure 1.

#### 208.03.10 USE OF CLSM

- A. CLSM Class I and Class II may be placed in all installations. However, for flexible pipe, in the pipe zone region, either full CLSM or full aggregate backfill is required. There can not be applied a mixing of CLSM and aggregate fill layers due to the different stresses that can occur on the pipe at the interface of both types of products.
- B. CLSM shall be placed directly into the space to be filled. The placement of CLSM shall include "spading" under the pipe haunches and into the corrugations or other difficult areas around a structure. Care shall be taken to prevent flotation or misalignment of the pipe by means of straps, soil anchors or other designed and approved means of restraint as per the manufacturer's recommendation. Material may be placed in stages equally on both sides of the pipe to prevent movement or flotation of pipe.
- C. If CLSM Class III - Bonded Aggregate Fill (BAF) is to be used, it shall be as specified in Subsection 704.03.07, "Controlled Low Strength Material (CLSM)." When used as backfill, CLSM Class III shall comply with Subsection 704.03.02, "Drain Backfill."

#### 208.03.11 FOUNDATION

- A. Trench foundation shall be stable prior to placing bedding material. If the Engineer determines that unsuitable materials exist at the trench foundation, the Contractor shall remove and replace the material as directed by the Engineer and as specified in Subsection 208.03.04, "Trench Over-Excavation."

#### 208.03.12 PIPE BEDDING

- A. **Dry Utilities:** Dry utilities shall be defined as facilities for fiber optics, electrical, telephone, television cable, traffic signals, and natural gas lines. Pipe bedding for dry utilities only may consist of sand in compliance with applicable utility agency's specifications. In all cases, when sand is used as a bedding material, the sand shall be moisture conditioned and mechanically compacted.
- B. **Wet Utilities:** Wet utilities shall be defined as facilities for sewer lines, water lines, and storm drains. Except as otherwise provided herein, or in the Special Provisions, or as otherwise shown on the plans, the trench shall be excavated to a depth of at least 4 inches to 6 inches below the bottom of the pipe barrel and to a depth that will be sufficient to provide at least 2 inches of clearance under the pipe bell (where applicable).

- C. Uniform and stable bedding shall be provided for the pipe and any protruding features of its joints and/or fittings with the exception that the middle of the bedding equal to 1/3 the pipe outside diameter shall be loosely placed (see Figure 1). The compaction shall be:
  - 1. Compaction density minimum = 90 percent of the maximum density as determined by test method AASHTO T180 with exception of the middle uncompacted area.
- D. The material for use as bedding shall be Type II/III Aggregate Base or CLSM complying with this section. Crushed Rock may be used to stabilize the trench foundation and shall be specifically approved by the governing agency.
- E. Bedding shall be backfilled to the required grade of the bottom of the pipe. When Crushed Rock is used for foundation stabilization, the Contractor shall follow the same procedures described below in **Subsection [208.03.16](#), "Drain Backfill."**
- F. All pipes shall be placed directly on the bedding material unless otherwise required or approved by the Engineer. If groundwater is present or anticipated to be present, the need for a filter material as specified in **Subsection [207.03.01](#), "General,"** shall be reviewed and approval may be required by the Engineer.

#### **208.03.13 HAUNCH ZONE BACKFILL**

- A. **Dry Utilities:** After pipe or conduit is laid, the haunch areas shall be backfilled with sand in compliance with applicable utility agency's specifications. In all cases, when sand is used as a backfill material, the sand shall be moisture conditioned and mechanically compacted.
- B. **Wet Utilities:** After the pipe or conduit is laid, the haunch areas shall be backfilled with Type II, Type III, Aggregate Base Backfill, or CLSM. Crushed Rock or drain backfill may be used for the haunch zone only if material use has been specifically approved by the governing agency. If crushed rock or drain backfill is used, comply with **Subsection [208.03.16](#), "Drain Backfill."**
- C. Compaction of the haunching material can best be accomplished by hand with tampers or suitable power compactors for maximum compacted lift thickness of 6 inches. The Contractor shall take care to not disturb the pipe from its line and grade and shall compact to:
  - 1. Compaction minimum = 90 percent of the maximum density as determined by test method AASHTO T180.
- D. While compacting the embedment near the pipe with impact-type tampers, caution shall be taken to not allow direct contact of the equipment with the pipe.

#### **208.03.14 INITIAL ZONE BACKFILL**

- A. **Dry Utilities:** Initial zone backfill for dry utilities may consist of sand in compliance with applicable utility agency's specifications. In all cases, when sand is used as a backfill material, the sand shall be moisture conditioned and mechanically compacted.
- B. **Wet Utilities:** After the pipe or conduit is laid, the initial backfill areas shall use Type II, Type III, Aggregate Base, or CLSM. Avoid usage of impact tampers directly above the pipe until the full loose layer backfill depth above the pipe is obtained. Crushed Rock or drain backfill may be used for the initial zone only if material use has been specifically approved by the governing agency. If crushed rock or drain backfill is used, comply with **Subsection [208.03.16](#), "Drain Backfill."** The depth of initial backfill above the pipe shall comply with Table 4:

**Table 4 - Initial Zone Material Depths**

Pipe or Conduit	Initial Zone
2-inch or less diameter	6 inches above the top of pipe
Greater than 2-inch diameter	12 inches above top of the pipe

**208.03.15 FINAL ZONE BACKFILL**

- A. The remaining backfill shall consist of one of the following types as determined by the Engineer.
- B. Granular, Selected, or CLSM Backfill. Backfill material from the initial backfill zone to a plane, which is below the bottom of the pavement section, shall be "Granular Backfill," "Selected Backfill," or CLSM.
  - 1. The material shall be compacted to:
    - a. Compaction minimum = 90 percent of the maximum density as determined by test method AASHTO T180.
    - b. If "Selected Backfill" is used in trenches 2 feet or less in width, no stones or lumps greater than 3 inches will be permitted.
  - 2. **CLSM:** When used, CLSM backfill shall be placed from the top of the initial backfill zone to the bottom of the bituminous pavement (top of aggregate base).
- C. CLSM Cap: Unless otherwise specified by the Contracting Agency, a CLSM Cap shall be required in the upper portion of the Final Zone for all non-residential roadways with a minimum thickness of 12 inches for all minor collectors and 24 inches for all major collectors and arterials.

**208.03.16 DRAIN BACKFILL**

- A. In the event that Drain Backfill is used to control groundwater, the Contractor shall, at no additional cost to the Contracting Agency, construct dams conforming to the requirements of **Section 501, "Portland Cement Concrete,"** Class II CLSM, or compacted Type II Aggregate Base. Construct the dams within the drain rock bedding material at each manhole or at intervals of 600 feet, whichever is less. Dams shall extend the width of the trench, a minimum of 18 inches in length, for the height of the drain backfill, and where Type II is used, the compaction shall be:
  - 1. Compaction minimum = 95 percent of the maximum density as determined by test method AASHTO T180.
- B. The Contractor shall install nonwoven geotextile filter fabric between the bedding and backfill material in such a manner to prevent migration of the backfill material into the bedding whenever Drain Rock or Crushed Rock is used as bedding.
- C. Geotextile filter fabric shall conform to the requirements specified in AASHTO M288, "Subsurface Drainage Geotextile."

**208.03.17 COMPACTION**

- A. Compaction shall be performed by mechanical means. Mechanically compacted backfill shall be placed in layers of thickness compatible with the characteristics of the backfill and the type of equipment being used and shall have a maximum lift thickness as indicated in Table 5 - Compaction Lift Thickness. The lifts shall be placed on both sides of the pipe at the same time to reduce pipe movement.



**Table 5 - Compaction Lift Thickness**

<b>Location</b>	<b>Maximum Compacted Lift Thickness (inches)</b>	<b>Maximum Loose Lift Thickness (inches)</b>
Bedding, Haunch, and Initial Zones	6	8
Final Zone Backfill	12	16

- B. Each layer shall be evenly spread, moistened, and tamped or rolled until the specified relative compaction has been attained.
- C. Compaction minimum = 90 percent of the maximum density as determined by test method AASHTO T180.

**208.03.18 TRANSITION INSTALLATIONS**

- A. When differential conditions of pipe support might occur, such as in transitions from manholes to trench, a transition support region shall be provided to ensure uniform pipe support and preclude the development of shear, or other concentrated loading on the pipe.

**208.03.19 MINIMUM DEPTH OF COVER**

- A. The minimum cover shall be as stated on the plans and/or contract Special Provisions. For flexible pipe, the minimum cover for compaction process using wheel or hydro hammer loads is 24 inches. Equipment used for the initial zone shall allow compaction to the lift requirements of this specification without damage to the pipe.

**208.03.20 TESTING**

- A. Where tests reveal non-compliance with the requirements of the Contract, the Contractor shall bear the costs of subsequent rework and retesting until the required specification compliance is obtained to the satisfaction of the Engineer.

**208.03.21 CUTTING AND RESTORING STREET SURFACING**

- A. Prior to beginning work within any public right-of-way, or cutting any street surfacing therein, an encroachment permit and barricade plan approval shall be obtained from the governmental entity or agency having jurisdiction over that right-of-way.
- B. Permit fees and construction restrictions shall be in accordance with the rules, regulations, and ordinances of the entity or agency having jurisdiction.
- C. While undergoing improvements, all streets upon or within which any work is being done shall be kept open to all traffic by the Contractor, as specified in **Subsection 104.04, "Maintenance of Traffic,"** unless otherwise approved by the Engineer, or as provided in the Special Provisions.
- D. Prior to beginning the work, barricading and traffic control devices conforming to the latest editions of the Traffic Control Plans for Highway Work Zones for the Clark County Area and the *Manual on Uniform Traffic Control Devices* shall be in place, and shall be in compliance with the governmental agency approved traffic control and barricade plan.
- E. Pavement in the area of the trench excavation may be wheel cut or spade cut.
- F. Temporary Steel Plate Bridging: When approved by the Engineer or Contracting Agency, the Contractor may use steel plates to bridge excavated trenches in areas where the

roadway surface is to be opened to traffic. Steel plates shall extend at least 12 inches beyond the edges of the trench. Trenches shall be adequately reinforced to support the bridging and traffic loads. Trench plate thickness shall be at least 3/4 inches for a 1 foot wide trench and shall increase 1/8 inch for every foot of trench width up to a thickness of 1-1/4 inch for a 5 foot wide trench. Steel plates for trench widths greater than 5 feet shall require a special structural design. Trench plates shall be coated with an Antiskid type surface meeting current Caltrans standards of a nominal Coefficient of friction of 0.35 in accordance with California test method 342 (Appendix H). Trench plates shall not be overlapped or stacked on top of another plate. At no time shall the length of any configuration of steel plates exceed three hundred feet or be left in place for longer than 14 days without prior written approval from the Engineer. The Contractor shall ensure that anchoring, strength and side supports are adequate to prevent collapse or movement of the plates. The placement and installation method for temporary steel plate bridging shall be as follows:

1. **Method 1: Roadways with posted speeds of 45 mph and greater, or when required by the Engineer** – The pavement shall be cold-planed to a depth equal to the thickness of the plate and to a width and length equal to the dimensions of the plate(s). Any voids shall be filled with cold mix and compacted to ensure that the roadway has a smooth drivable surface and the plate is flush with the top of the roadway surface (recessed into the asphalt.) The Contractor shall ensure that the approach and ending plates are securely attached to the roadway by a minimum of 2 dowels pre-drilled into the corners of the plate and drilled 2 inches into the pavement, subsequent plates shall be butted to each other. Steel Plate Ahead (W8-24) signs shall be used and shall be placed in accordance with the MUTCD and all municipal codes.
  2. **Method 2: Roadways with posted speeds less than 45 mph** – Approach and ending plates shall be attached to the roadway by a minimum of 2 dowels pre-drilled into the corners of the plate and drilled 2 inches into the pavement. Subsequent plates shall be butted to each other. Fine graded asphalt concrete shall be compacted to form ramps with a maximum slope of 8.5% and a minimum 18 inch taper to cover all edges of the steel plates. Steel Plate Ahead (W8-24) signs shall be used and shall be placed in accordance with the MUTCD and all municipal codes. When steel plates are removed, the dowel holes in the pavement shall be backfilled with either graded fines of asphalt concrete mix, concrete slurry, or equivalent slurry approved by the Engineer.
- G. Whenever permanent pavement patches are not constructed immediately following trench backfilling operations, temporary pavement patches consisting of a minimum of 2 inches of hot or cold plantmix or plates shall be utilized to provide the required number of paved travel lanes. Bump Ahead (W8-1) signs shall be used and shall be placed in accordance with the MUTCD and all municipal codes. Temporary pavement patches may be left in place for a maximum of 30 working days following completion of backfilling operations unless otherwise approved by the Engineer.
- H. The following surface tolerance for temporary patches shall be observed. When a 12-foot straight edge is laid across the temporary patch parallel to the centerline of the street and in a direction transverse to the centerline, a rut, hump, or depression of more than 1/2 inch shall not be evident. Deteriorated temporary patches exhibiting ruts, humps, or depressions shall be repaired or replaced immediately upon notification of the Engineer. If the existing street exceeds the above tolerances, then the temporary patch shall be equal to or better than the condition of the surrounding pavements.

- I. Unless otherwise specified and approved, prior to placing the permanent patch, the existing pavement shall be saw cut to a neat line and to a minimum width as shown on the Standard Drawings for Pavement Restoration.
- J. Existing aggregate base, shall be scarified and recompact to meet the requirements of **Section 302, "Aggregate Base Courses."** Compaction by rolling with vehicle tires will not be permitted. Aggregate base courses that were constructed with geosynthetics shall be repaired in conformance with the manufacturer's recommendations.
- K. Existing asphalt concrete shall be replaced with the same depth on major streets (greater than 60 feet of planned right-of-way) except that the minimum depth shall be 4) inches and shall be placed in multiple lifts of equal thickness. Existing asphalt concrete shall be replaced with the same depth in local streets (60 feet or less of planned right-of-way) except that the minimum depth shall be 3 inches; for existing depth of 4 inches or more, pavement shall be replaced in multiple lifts of equal thickness within the parameters established in **Section 401, "Plantmix Bituminous Pavements - General."** The pavement material shall be similar to the original. If not known, request from the Engineer the current mix type used on Contracting Agency Capital Improvement Projects (CIP).
- L. Completion of the permanent patch in areas where an open graded surface course exists, which is less than 10 years in age, shall include placement of a surface course to match the existing surface texture and material mix design, including original bituminous cement type.
- M. In areas where lime treated sub-base, cement modified sub-base, soil cement, or similar materials have been used, the Contractor may substitute a lean concrete mix or asphalt concrete equivalent, subject to approval of the Engineer.
- N. Upon completion of the permanent patch, including the surface treatment, the surface shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. The Contractor shall inspect with a straightedge 12 feet long that is laid across the permanent patch parallel to the centerline of the street and in a direction transverse to the centerline. The surface shall not vary more than 1/4 inch from the lower edge of the straightedge. Patches exhibiting deviations greater than 1/4) inch shall be replaced or use mechanical grinding prior to acceptance of the patch. If the existing street exceeds the above tolerances, then the patch shall be equal to or better than the condition of the surrounding pavement. The Contractor shall submit a report of the tolerance testing to the Engineer for approval prior to the acceptance of the patch.
- O. Any concrete improvements disturbed or damaged during construction shall be replaced prior to placement of the permanent pavement patch.
- P. All traffic control devices removed or disturbed during construction shall be replaced upon completion of the permanent patch including but not limited to delineation, paint, thermoplastic pavement markings, and traffic signal detector loops. Temporary lane lines and other markings used during construction shall be permanently removed, to the satisfaction of the Engineer, prior to placing the new traffic stripes or markings.

#### 04METHOD OF MEASUREMENT

##### 208.04.01 MEASUREMENT

- A. Unless otherwise provided in the Special Provisions, trench excavation and backfill will not be measured for payment.

- B. The quantity of Permanent Patch to be measured for payment will be the number of square yards complete, in place, and conforming to all requirements herein.

#### 05BASIS OF PAYMENT

##### 208.05.01 PAYMENT

- A. Unless otherwise provided in the Special Provisions, no payment will be made for trench excavation or backfill as such; the cost thereof under normal circumstances being considered as included in the price bid for the construction or installation of the items to which such excavation or backfill is incidental or appurtenant.
- B. No payment will be made for temporary cold plantmix patching as such; the cost thereof is considered as included in the price bid for the construction or installation of the items to which such patching is incidental or appurtenant.
- C. The contract unit price paid for Permanent Patch as measured in ***Subsection 208.04.01, "Measurement,"*** shall be full compensation for saw cutting, removal of asphalt, Type II aggregate base, prime coat, tack coat, and seal coat if required, asphaltic pavement (excluding open-grade or gap-grade UTACS), pavement markings, compaction, and for all labor, tools, equipment and incidentals necessary to complete the work as specified herein, as shown on the plans, and as directed by the Engineer. Compensation for trenching, backfilling, and compaction of pipe zone and other items of work, which are considered as part of underground piping or conduit work, shall be included with the contract bid item for such piping or conduit work.
- D. Payment for such excavation or backfill will be made only when the Special Provisions provide.
- E. All payments will be made in accordance with ***Subsection 109.02, "Scope of Payment."***
- F. Payment will be made under:

#### PAY ITEM

#### PAY UNIT

Permanent Patch .....Square Yard